4.5 Biological Resources – Bioregional Summary

The following section contains a summary of the biological resources found in each Bioregion. The following description of biological and environmental conditions is excerpted from the California Department of Fish and Game (CDFG) Wildlife Action Plan. See CDFG web site to view the full report (http://www.dfg.ca.gov/wildlife/wap/report.html)

Regulatory Framework

California Environmental Quality Act (CEQA)

CEQA provides that public agencies whose activities may affect the environment shall prevent environmental damage (CCR § 15000-15387). Rare threatened, or endangered plant species, subspecies, and varieties are specifically considered in various sections of CEQA (CCR §15380). CEQA Guidelines Section 15380 (b) provides the criteria for Endangered, Rare, and Threatened species. Section 15380 (d) states that species that re not on state and federal lists, but meet the criteria in subsection (b) of Section 15380, "shall nevertheless be considered to be endangered, rare or threatened." CNPS Lisa 1A, 1B, and 2 plant species will be initially presumed to meet these criteria subject to review and reassessment during scoping. Additionally, under Section 15380 species will be considered Endangered, Rare, or Threatened, if it is listed as such under the California or Federal Endangered Species Act (ESA). Species designated as candidates for listing by the fish and Game Commission under the CESA also are "presumed to be endangered." The California ESA presumes that candidate species meet the criteria for listing as Endangered, Rare, or Threatened. Sate certified regulatory programs are subject to provisions in CEQA regarding the avoidance of significant adverse effects on the environment, including native plant communities and rare, threatened, and endangered plants, where feasible (CCR § 15250.) Public Resources Code § 21080.5(d)(2)(a) states that the rules and regulations adopted by the administering agency of a certified regulatory program shall "require that an activity will not be approved or adopted as proposed if there are feasible mitigation measures available which would substantially lessen any significant adverse effect which the activity may have on the environment." The FPRs are a State Certified Regulatory Program (CCR § 15251 (a)) and are subject to these rules.

Native Plant Protection Act (NPPA)

The Native Plant Protection Act (Fish and Game Code Native Plant Protection Act § 1900-1913) was enacted in 1977. This act established the criteria for determining if a species, subspecies, or variety of native plant is endangered or rare. It also has been established that state agencies, in consultation with CDFG, shall implement programs for the conservation of endangered or rare native plants (Fish and Game Code §1911). However, THPs submitted in accordance with the Z'berg-Nejedly Forest Practice Act of 1973 are exempt from this type of regulation (Fish and Game Code §1913). Under this Fish and Game Code Section, where CDFG notifies a landowner that a rear or endangered plant is growing on their land, the landowner shall notify the Department at least 10 days in advance of changing the land use to allow the Department to salvage the plant. Submission of a THP is considered notification of the Department of Fish and Game under this section. Other

management activities may not be exempted from Fish and Game Code Section 1911 (Fish and Game Code Section 1913).

California Endangered Species Act (CESA)

The California Endangered Species Act (Fish and Game Code § 2050-2116) was enacted in 1984 and enhanced protection for endangered, rare, and threatened plant species. Indeed, "it is the policy of the state to conserve, protect, restore, and enhance any endangered species or any threatened species and its habitat" (Fish and Game Code § 2052). It is also state policy to disapprove projects that are proposed without feasible mitigation to reduce the impacts below the level of significance and that would jeopardize the continued existence of any endangered or threatened species or result in the adverse modification of habitat essential to the existence of those species (Fish and Game Code § 2053-2055).

Regulatory Framework for the Protection of Fish and Wildlife Resources

State agencies, including CAL FIRE, are directed through a variety of programs and policies to protect and manage California's Wildlife resources. These include:

- CEQA
- California Forest Practice Rules
- California Fish and Game Code
- California State Endangered Species Act (CESA)
- Federal Endangered Species Act (FESA)

CEQA

CEQA provides that public agencies whose activities may affect the environment shall prevent environmental damage (CCR § 15000-15387). Rare, threatened, or endangered species, subspecies, and varieties are specifically considered in various sections of CEQA (CCR § 15380). State certified regulatory programs are subject to the provisions in CEQA regarding the avoidance of significant adverse effects on the environment, including rare, threatened, and endangered species, where feasible (CCR § 15250).

California Forest Practice Rules

Forest management activities on the Forest are subject to the requirements of the Forest Practice Act (FPA) as administered through the Forest Practice Rules (FPR). Registered Professional Foresters (RPFs) follow the provisions of the FPA and FPRs in preparation of timber harvesting plans (THPs). The THP preparation and review process substitutes for the EIR process under CEQA pursuant to PRC section 21080.5. THPs are designed to achieve maximum sustained production of high quality forest products while giving consideration to values relating to recreation, watershed, wildlife, range and forage, fisheries and aesthetic enjoyment as directed by PRC 4651.

The FPRs require timber operations to be designed in a manner that maintains functional wildlife habitat in sufficient condition for continued use by the existing wildlife community within the planning watershed and retains or recruits late and diverse seral stage habitat components for wildlife concentrated in the WLPZs and as appropriate to provide for functional connectivity

between habitats [14 CCR § 897(b)(1)(B)-(C)]. In addition, the FPRs require RPFs to consider the proposed timber operations in the context of the larger forest and planning watershed in which they are located, so that biological diversity is maintained within larger planning units and adverse cumulative impacts are reduced [14 CCR § 897(b)(2)]. The appendix to Board of Forestry Technical Rule Addendum No. 2 instructs the RPF to consider the factors set forth therein when evaluating cumulative impacts. Factors that the RPF must consider are:

- Any known rare, threatened, or endangered species or sensitive species (as described in the Forest Practice Rules) that may be directly or indirectly affected by project activities;
- Any significant, known wildlife or fisheries resource concerns within the immediate project area and the biological assessment area;
- The aquatic and near-water habitat conditions on the THP and immediately surrounding area (pools and riffles, large woody material in the stream, near-water vegetation); and
- The biological habitat condition of the THP and immediately surrounding area (snags/den trees, hardwood cover, downed, large woody debris, late seral (mature) forest characteristics, multistory canopy, late seral habitat continuity, road density and special habitat elements).

Furthermore, the FPRs require the RPF to specifically address wildlife under Article 9 sections 919 through 919.18. In doing so, the RPF must:

- Retain all snags to provide wildlife habitat, except in certain specific cases (near main ridge tops suitable for fire suppression; near public roads, permanent roads, seasonal roads, landings, and railroads; where safety laws and regulations require snags removal; near structures maintained for human habitation; merchantable snags; and for insect or disease control [14 CCR § 919.1(a)-(e)].
- Provide general protection for sensitive species [per 14 CCR §§ 895.1 and 898.2(d)]. This includes: A mandatory pre-harvest inspection; protection of nest tree(s), designated perch trees(s), screening tree(s), and replacement trees(s) during timber operations; commencement of timber operations as far as possible from occupied nest trees; and protection of the occupied nest tree, screening trees, perch trees, and replacement trees if discovered during timber operations [14 CCR § 919.2(a)-(d)]. Some exceptions to these requirements are allowed.
- Provide specific protection for sensitive species (Bald Eagle, Peregrine Falcon, Golden Eagle, Great Blue Heron, Great Egret, Northern Goshawk, and Osprey). The specific protection measures include buffer zones around all nest trees containing active nests; year-around restrictions within buffer zones; establishment of critical periods for each species with applicable requirements during these critical periods; and limits on helicopter logging during the critical period (14 CCR § 919.4(a)-(e)).
- Incorporate feasible practices to reduce impacts (as described in 14 CCR § 898) where significant adverse impacts to non-listed species are identified (14 CCR § 919.4).

- Ensure that timber operations will not result in “take” of the Northern Spotted Owl and Marbled Murrelet (14 CCR §§ 919, 919.10 and 919.11).
- Provide habitat structure information for late succession forest stands proposed for harvesting where such harvest will significantly reduce the amount and distribution of late succession forest stands or their functional wildlife habitat value so that it constitutes a significant adverse impact on the environment. Also, the RPF must provide a statement of objectives over time for late succession forest stands on the ownership and include a discussion of how the proposed harvesting will affect the existing functional wildlife habitat for species primarily associated with late succession forest stands in the plan or the planning watershed, as appropriate, including impacts on vegetation structure, connectivity, and fragmentation.
- Where timber operations will result in long-term significant adverse effects on fish, wildlife, and listed species known to be primarily associated with late successional forests, feasible mitigation measures to mitigate or avoid such long-term significant adverse effects must be described and incorporated. Where long-term significant adverse effects cannot be avoided or mitigated, the RPF must identify the measures that will be taken to reduce those remaining effects and provide reasons for overriding concerns pursuant to 14 CCR § Section 898.1(g), including a discussion of the alternatives and mitigation considered [14 CCR § 919.16(a)-(b)].

California Fish and Game Code and CESA

The California Endangered Species Act (CESA) (Fish and Game Code § 2050-2116) was enacted in 1984 and enhanced protection for endangered, rare, and threatened species. Under CESA, “it is the policy of the state to conserve, protect, restore, and enhance any endangered species or any threatened species and its habitat” (Fish and Game Code § 2052). It is also state policy to disapprove projects that are proposed without feasible mitigation to reduce the impacts below the level of significance and that would jeopardize the continued existence of any endangered or threatened species or result in the adverse modification of habitat essential to the existence of those species (Fish and Game Code § 2053 - 2055). CESA generally parallels the main provisions of the Federal Endangered Species Act and is administered by the California Department of Fish and Game (DFG). CESA prohibits the "taking" of listed species except as otherwise provided in State law. Unlike its Federal counterpart, CESA applies the take prohibitions to species petitioned for listing (state candidates). Section 86 of the Fish and Game Code defines "take" as "hunt, pursue, catch, capture, or kill, or attempt to hunt, pursue, catch, capture, or kill."

State lead agencies are required to consult with DFG to ensure that any action it undertakes is not likely to jeopardize the continued existence of any endangered or threatened species or result in destruction or adverse modification of essential habitat. A "lead agency" is defined under the California Environmental Quality Act as the public agency which has principal responsibility for carrying out or approving a project that may have a significant effect on the environment (PRC §21067).

Federal Endangered Species Act (FESA)

The Federal Endangered Species Act (FESA) requires formal or informal consultation with the US Fish and Wildlife Service or NOAA Fisheries where it is likely that the project could affect federally listed threatened or endangered species. The purpose of the ESA is to conserve the ecosystems upon which listed species depend. The laws ultimate goal is to “recover” listed species such that the protections of the Act are no longer needed. The ESA requires that recovery plans be developed that describe the steps necessary to restore the species. Similarly, the ESA provides for the designation of “critical habitat” when prudent and determinable. Critical habitat includes geographic areas where those physical and biological features essential to the conservation of the species are found and which may require special management considerations or protection. Critical habitat designations affect only Federal agency actions or federally funded or permitted activities. The Act also makes it unlawful to kill or injure a listed species, which includes significant habitat modification or degradation where it actually kills or injures listed species by significantly impairing essential behavioral patterns, including breeding, feeding or sheltering.

Regulatory Framework for the Protection of Wetlands

Government responses to wetland losses have come in the form of legal restrictions on uses of wetlands as well as protection through acquisition, restoration, and management.

Section 401, Clean Water Act: Federal protection is described in Section 401 of the Clean Water Act. This requires that State water quality standards not be violated by the discharge of fill or dredged material into “Waters of the United States.” Section 404 of the Clean Water Act authorizes the US Army Corps of Engineers (ACOE) to issue permits for discharges of dredged or fill material into streams and wetlands.

State and Federal Coastal Acts: Wetlands found in the "coastal zone" are regulated under the California Coastal Act of 1976 (CCA) and the federal Coastal Zone Management Act (CZMA), and are within jurisdiction of the California Coastal Commission. Jackson Demonstration State Forest (JDSF) does not lie within the coastal zone, although portions of the assessment area for this EIR do.

Forest Practice Rules: The California Forest Practice Rules provide protections for wetlands in Coastal Zone Special Treatment Areas, and generally for marshes, wet meadows, springs, riparian areas, and other wet areas.

General Vegetation Types

North Coast and Klamath: Vegetation, Ownership, and Species of Concern

Table 4.5.1
Habitat Type and Land Ownership North Coast/Klamath Bioregion

Habitat Type	Bureau of Land Management	National Park Service	Other Public	Private	USDA Forest Service	Total Acres
Agriculture	163	96	7,468	283,736	292	291,755
Barren/Other	4,584	549	5,085	46,219	65,614	122,050
Conifer	214,159	79,299	231,614	3,195,621	4,201,992	7,922,685
Hardwood	126,916	28,931	99,900	2,016,071	635,963	2,907,780
Herbaceous	17,732	2,585	16,556	1,031,467	36,750	1,105,090
Shrub	224,265	5,866	18,758	730,975	733,599	1,713,463
Urban	353	148	6,479	114,425	2,456	123,862
Water	1,112	4,275	14,201	77,443	58,920	155,951
Wetland	77		6,489	31,548	4,401	42,514
Total Acres	**589,361**	**121,749**	**406,550**	**7,527,504**	**5,739,986**	**14,385,151**

Coastal wetland communities, including estuaries, lagoons, marshes, and open-water bays, are important for shorebirds and provide nursery habitats for anadromous**,** oceanic, and near-shore fish. The coastal wetlands include the estuary at the mouth of the Smith River, Lake Talawa and Lake Earl, Humboldt Bay, the mouth of the Eel River, and Bodega and Tomales bays.

Grasslands, coastal shrub, pine forests, mixed evergreen forests, and redwood forests are typical terrestrial plant communities. Unique, geographically limited habitats include sphagnum bogs and pygmy scrub forests.

The region's coastal redwoods are among the largest, tallest, and oldest trees in the world, often exceeding 200 feet in height, 15 feet in diameter, and 2,000 years in age. Redwood groves are patchily distributed across the coastal fog belt that extends up to 40 miles inland and where winter rains and summer fog provide a persistent moist environment. Some inhabitants of coastal redwood forests include black bear, Roosevelt elk, MacGillivray's warbler, olive-sided flycatcher, marbled murrelet, Pacific giant salamander, rough-skinned newt, and the banana slug.

The region's inland Klamath-Siskiyou mountain ranges are recognized for their biological diversity and have been designated as an area of global botanical significance by the World Conservation Union (IUCN), as one of 200 global conservation priority sites by the World Wildlife Fund, and as a proposed United Nations' biosphere reserve (Ricketts et al., 1999). These mountains harbor some of the most floristically diverse temperate coniferous forests in the world, attributable in part to the region's variable climate, geography, and soil types, which create a variety of ecological communities. Unique, localized conditions have given rise to endemic species that have evolved to specialize in these areas, including nearly 100 plant species that are restricted to serpentine soils. Additionally, portions of the region remained unglaciated during the last ice ages and have served as centers of distribution for numerous species that sought refuge there. Finally, these mountains represent the intersection of coastal ecosystems with the inland Klamath Basin

region. As a result, the inland mountains and river systems support a rich flora and fauna that include species from both regions. The Klamath River system, for instance, harbors both coastal fish, like salmonids and Coast Range sculpin, and fish whose ranges extend from the inland Klamath Basin, such as the tui chub.

Ecological communities of the inland mountain ranges include moist inland forests dominated by Douglas fir, ponderosa pine, and sugar pine mixed with a variety of other conifers and hardwoods; drier oak forests and savannas; serpentine soil–associated plant communities and shrublands and high elevation subalpine forests. More than 3,000 plant species are known from these inland mountain ranges, and the area supports some 30 temperate conifer tree species, more than any other ecosystem in the world. Wildlife inhabitants include such sensitive species as the northern spotted owl, northern goshawk, Humboldt marten, and Pacific fisher, as well as common species like mule deer, black bear, and red-tailed hawk.

The fish fauna of the Klamath River System (below Copco Lake and Iron Gate reservoir) is dominated by anadromous fish species such as Pacific lamprey, Chinook and coho salmon, steelhead, and coastal cutthroat trout. Predominately freshwater species are also abundant in the system and include a variety of introduced species and two natives, the speckled dace and Klamath smallscale sucker. Coastal streams, flowing directly to the ocean, support a fish fauna composed predominately of anadromous species and euryhaline freshwater and marine species. The Klamath and Trinity Rivers collectively support the second largest Chinook salmon populations in California.

The upper Klamath River System includes Upper and Lower Klamath lakes and Tule Lake. The fish fauna is dominated by freshwater species including the Klamath Lake sculpin, shortnose sucker, and the Lost River sucker. Stream and lake dwelling species include the dwarf Pacific lamprey, rainbow trout, Klamath largescale sucker, blue chub, Klamath tui chub, speckled dace, and marbled sculpin. Introduced species numbers appear to be increasing in number in the reservoirs of the river system (Moyle, 1976).

The region is known for these extensive river systems and the anadromous fish populations they support. The majority of California's river segments with state or federal Wild and Scenic river designations occur in the North Coast–Klamath Region, including portions of the Klamath, Trinity, Smith, Scott, Salmon, Van Duzen, and Eel. Anadromous fish species include coho and chinook salmon, steelhead, coast cutthroat trout, green sturgeon, and Pacific lamprey. The region has seen sharp declines in its fish populations, with an 80 percent decline in salmon and steelhead between the 1950s and 1990s (California State Lands Commission, 1993).

Nonetheless, the remaining fish populations still represent the most important anadromous fish runs in the state. The region's rivers support one-third of the state's chinook, most of the state's coho salmon and steelhead, and all of the coast cutthroat trout (California State Lands Commission, 1993).

The North Coast and Klamath's wide range of habitats has given rise to remarkable biological diversity. There are 501 vertebrate species that inhabit the area at some pint in their life cycle, including 282 birds, 104 mammals, 26 reptiles, 30 amphibians, and 59 fish. Of the total vertebrate species that inhabit this region, 76 bird taxa, 26 mammalian taxa, two reptilian taxa, 13 amphibian

taxa, and 42 fish taxa are included on the Special Animal List. Of these, 13 are endemic to the region, and nine other species found here are endemic to California but not restricted to this area.

Central Coast: Vegetation, Ownership, and Species of Concern

Table 4.5.2
Habitat Type and Land Ownership Central Coast Bioregion

Habitat Type	Bureau of Land Management	National Park Service	Other Public	Private	USDA Forest Service	Total Acres
Agriculture	326		5,501	638,528	494	644,849
Barren/Other	897		8,715	19,081	17,507	46,201
Conifer	2,926	5	39,567	165,968	291,972	500,438
Desert	427		27	2,061		2,516
Hardwood	86,707	3,749	133,541	1,299,829	225,390	1,749,215
Herbaceous	129,006	2,800	121,917	2,368,886	27,434	2,650,042
Shrub	91,587	8,379	166,154	949,670	1,126,089	2,341,879
Urban	1,344	7	31,597	259,218	526	292,694
Water	42	7	25,054	18,988	670	44,761
Wetland			1,858	1,829		3,687
Total Acres	**313,263**	**14,947**	**533,931**	**5,724,058**	**1,690,082**	**8,276,281**

Sand dunes and wetlands occur along the coast. River-mouth estuaries, lagoons, sloughs, tidal mudflats, and marshes make up coastal wetland communities, a unique environment where marine, freshwater, and terrestrial systems meet. Elkhorn Slough and Morro Bay are the region's two largest estuaries, with other significant wetlands found at the Pajaro, Salinas, and Santa Maria river mouths, Devereux Slough, and Goleta Slough (Page and Shuford, 2000).

Other coastal habitats include coastal scrub and maritime chaparral. Coastal scrub and grasslands also extend inland along river valleys, like the lower Salinas Valley, where the moist maritime climate reaches through gaps in the coastal ranges. Maritime chaparral, characterized by manzanita and California lilac species adapted to the foggy coastal climate, once dominated sandy hills along Monterey Bay, Nipomo Mesa, Burton Mesa, and Morro Bay. Maritime chaparral is now one of the region's most threatened community types, with its extent severely reduced by development.

The outer Coast Ranges, including the Santa Cruz and Santa Lucia mountains, run parallel to the coastline. Well-watered by the moist ocean air, these slopes are drained by streams that run all year. The Santa Lucia Mountains provide most of the water supply to the Salinas River. These ranges support mixed coniferous forests and oak woodlands. The dominant coniferous species include ponderosa pine, Douglas fir, red alder, and, in the north, redwoods. The oak woodlands are dominated by coast live oak and valley oak. Rarer, endemic tree species include Monterey pine and Santa Lucia fir.

Moving inland across the Gabilan, Diablo, Temblor, and Sierra Madre mountain ranges, the climate becomes progressively drier, and the vegetation shifts to oak woodlands, grasslands, interior chaparral, and desert-like interior scrub. Interior streams are mostly intermittent, drying in the summer and fall, except at the higher elevations of the Sierra Madre ranges, where streams run

year round. Biologically diverse oak woodland communities support more than 200 species of plants, 300 vertebrates, and 5,000 invertebrates (Thorne et al., 2002; TNC, 1997). Large expanses of annual grasslands are dominated by non-native grasses are inhabited by California ground squirrel and black-tailed jackrabbit, along with sensitive species that include the giant kangaroo rat, burrowing owl, San Joaquin kit fox, American badger, and, in the southern portion of the region, reintroduced tule elk and pronghorn. Interior chaparral habitats support drought-resistant woody shrubs, including manzanita, California lilac, and chamise.

The Central Coast's largest drainages include the Salinas, Santa Maria, Pajaro, and Santa Ynez watersheds. Riverine and riparian habitats are important to amphibian and reptile species like the California red-legged frog, foothill yellow-legged frog, and Western pond turtle, and birds like the bank swallow, the Lawrence's goldfinch (on Fish and Game's Special Animals List), and the least Bell's vireo (federally listed as endangered). Steelhead and coho salmon (both federally listed as threatened) are still present, in small numbers, in most of the streams where they historically occurred. Mammals that use riparian habitats include gray fox, striped skunk, mole and shrew species, and ringtail.

Higher-elevation riparian vegetation in moist coastal climates includes willow, alder, bay, maple, Douglas fir, and sometimes redwood, while valley-bottom riparian communities are dominated by sycamore, willow, alder, and cottonwood. Steep coastal streams in the forested Santa Cruz and northern Santa Lucia mountains are some of the region's most intact systems and host relatively healthy anadromous fish populations (CDFG, 1996). In contrast, the majority of the region's large river-valley floodplain and riparian forests have been replaced by agriculture, and lowland fish assemblages have been severely compromised.

Seasonal vernal-pool wetland complexes are found in many parts of the region, including the Salinas River drainage and coastal dune terraces and mesas of Santa Barbara County, and seasonal sag ponds are found along the San Andreas Fault zone, particularly in the eastern portion of San Luis Obispo County.

The San Andreas Fault runs the length of the region and shapes much of the region's geography. Most of the north-south running mountain ranges and valley depressions have been formed as a result of pressure between the two continental plates meeting at this fault zone. Compression, chemical interaction, and surfacing of ancient seabed sediments have produced serpentine soils that are rich in such metals as chromium, nickel, and cobalt, but poor in nutrients. A number of plants have adapted to these harsh, near-toxic conditions, resulting in unique, island-like ecological communities largely restricted to serpentine areas (Center for Biological Diversity, 2004; TNC, 1997).

The Central Coast's wide range of habitats has given rise to remarkable biological diversity. There are 482 vertebrate species that inhabit the Central Coast region at some point in their life cycle, including 283 birds, 87 mammals, 42 reptiles, 25 amphibians, and 45 fish. Of the total vertebrate species that inhabit this region, 80 bird taxa, 36 mammalian taxa, 14 reptilian taxa, eight amphibian taxa, and 15fish taxa are included on the Special Animals List. Of these, 13 are endemic to the Central Coast region, one is endemic to California but introduced to this region, and 24 other species found here are endemic to California but not restricted to this region.

South Coast: Vegetation, Ownership, and Species of Concern

Table 4.5.3
Habitat Type and Land Ownership South Coast Bioregion

Habitat Type	Bureau of Land Management	National Park Service	Other Public	Private	USDA Forest Service	Total Acres
Agriculture	457	27	15,269	477,833	311	493,897
Barren/Other	284	193	2,997	29,917	10,371	43,762
Conifer	7,257		28,877	81,594	374,926	492,654
Desert	7,465		8,770	65,196	22,138	103,569
Hardwood	2,444	1,648	44,131	210,855	144,720	403,797
Herbaceous	1,455	1,166	84,648	360,949	9,360	457,580
Shrub	127,049	14,930	297,648	1,350,960	1,155,210	2,945,798
Urban	512	247	66,461	1,967,038	7,109	2,041,367
Water	126	7	12,607	45,161	4,337	62,238
Wetland			4,932	8,575	180	13,687
Total Acres	**147,050**	**18,219**	**566,341**	**4,598,078**	**1,728,663**	**7,058,350**

Source: Compiled from CAL FIRE, 2003

The region's largest river drainages include the Tijuana, San Diego, San Luis Rey, Santa Margarita, Santa Ana, San Gabriel, Los Angeles, Santa Clara, and Ventura Rivers. Pine forests occur along high-elevation stream reaches, and mountain drainages host mountain yellow-legged frog, California redlegged frog, Santa Ana sucker, and Santa Ana speckled dace. Lower-elevation river reaches support riparian vegetation species, including cottonwood, willow, sycamore, and coast live oak, which provide habitat for such riparian bird species as the least Bell's vireo, southwestern willow flycatcher, Swainson's thrush, and yellow warbler, as well as the arroyo toad.

River flow in this bioregion is closely tied to rainfall. In addition, rivers are more intensively channelized and managed by dams than those in other regions of California. Remnant steelhead runs can be found in the Ventura and Santa Clara Rivers. Other native fish species such as the arroyo chub and Santa Ana sucker have exhibited significant declines in number and available habitat (Trust for Public Lands, 2001).

The region is recognized as one of the world's hotspots of biological diversity and is home to a total of 476 vertebrate animal species, approximately 38 percent of all the vertebrate species found in California. It is also distinguished by the tremendous population growth and urbanization that have transformed the landscape since the 1940s. This intersection of biological resources and urbanization has made the South Coast the most-threatened biologically diverse area in the continental U.S. (USGS, 2003). More than 150 species of vertebrate animals and 200 species of plants are either listed as protected or considered sensitive by wildlife agencies and conservation groups (Hunter, 1999).

The South Coast's widely variable geography and diverse climate have given rise to remarkable biological diversity. There are 476 vertebrate species that inhabit the South Coast Region at some point in their life cycle, including 287 birds, 87 mammals, 52 reptiles, 16 amphibians, and 34 fish. Of the total vertebrate species that inhabit this region, 82 bird taxa, 40 mammalian taxa, 19 reptilian taxa, eight amphibian taxa, and nine fish taxa are included on the Special Animals List. Of these, 14

are endemic to the South Coast Region, and 14 other species found here are endemic to California but not restricted to this region.

Sacramento Valley, San Joaquin Valley and Bay Delta: Vegetation, Ownership, and Species of Concern

Table 4.5.4
Habitat Type and Land Ownership Sacramento Valley Bioregion

Habitat Type	Bureau of Land Management	Other Public	Private	USDA Forest Service	Total Acres
Agriculture	642	16,707	1,815,837	141	1,833,327
Barren/Other	259	1,337	16,939		18,535
Conifer	20	121	3,548		3,689
Hardwood	10,173	20,426	489,624	12	520,236
Herbaceous	11,940	49,362	1,029,747	17	1,091,067
Shrub	6,052	467	26,193		32,712
Urban	277	14,920	305,936	32	321,165
Water	487	13,250	40,565		54,301
Wetland	400	24,347	52,527	17	77,292
Total Acres	**30,251**	**140,937**	**3,780,917**	**220**	**3,952,325**

Table 4.5.5
Habitat Type and Land Ownership San Joaquin Valley Bioregion

Habitat Type	Bureau of Land Management	Other Public	Private	USDA Forest Service	Total Acres
Agriculture	638	32,383	4,940,368		4,973,389
Barren/Other	128	99	2,283	536	3,047
Conifer	5,931	1,611	20,801	54,818	83,161
Desert	34,711	15,350	76,941		127,002
Hardwood	19,633	2,884	151,046	2,723	176,285
Herbaceous	208,942	96,035	1,885,587	2,612	2,193,176
Shrub	31,039	1,774	85,046	8,807	126,666
Urban	2,718	9,133	408,623	128	420,603
Water	3,432	4,369	36,021		43,822
Wetland	5	17,285	53,859		71,149
Total Acres	**307,177**	**180,923**	**7,660,576**	**69,624**	**8,218,300**

Table 4.5.6
Habitat Type and Land Ownership Bay Delta Bioregion

Habitat Type	Bureau of Land Management	National Park Service	Other Public	Private	Total Acres
Agriculture	769		9,973	1,354,439	1,365,181
Barren/Other	52	1,334	1,418	8,320	11,125
Conifer	7,388	18,669	44,637	298,755	369,450
Desert			22	12	35
Hardwood	7,131	8,120	83,198	826,585	925,034
Herbaceous	1,816	27,051	59,802	1,192,496	1,281,165
Shrub	32,072	22,652	67,015	435,993	557,732
Urban	72	4,033	57,640	928,637	990,381
Water	146	1,154	41,326	72,199	114,825
Wetland	346	1,035	24,953	68,629	94,963
Grand Total	**49,792**	**84,048**	**389,984**	**5,186,065**	**5,709,889**

The Sacramento Valley, San Joaquin Valley and Bay-Delta Region comprise most of the low-lying lands of Central California. Much of the region is part of a vast hydrological system that drains 40 percent of the state's water. This water, falling as either rain or snow over much of the northern and central parts of the state, drains along the Sacramento and San Joaquin rivers into the Delta. In the Delta, freshwater from these rivers mixes with saltwater from San Francisco Bay, creating a rich and diverse aquatic ecosystem. Encompassing 1,600 square miles of waterways, the San Francisco Bay and Delta together form the West Coast's largest estuary and the second-largest estuary in the nation.

The region has four distinct subregions: the San Francisco Bay Area, the Delta, the Sacramento Valley, and the San Joaquin Valley. Each has unique combinations of climate, topography, ecology, and land-use patterns.

The San Francisco Bay Area subregion, the most densely populated area of the state outside of the Southern California metropolitan region, consists of the low-lying baylands, aquatic environments, and watersheds that drain into San Francisco Bay. It is bounded on the east by the Delta subregion, on the north by the North Coast Region, on the south by the Central Coast Region, and on the west by the Pacific Ocean. Low coastal mountains surround San Francisco Bay, with several peaks rising above 3,000 feet. The region receives 90 percent of its surface water from the major Central Valley rivers via the Delta. Other major rivers draining into the Bay include the Napa and Petaluma rivers and Sonoma, Petaluma, and Coyote creeks. The Bay Area has relatively cool, often foggy summers and cool winters, strongly influenced by marine air masses. Rain falls almost exclusively during the winter (October to April) and averages 15–25 inches annually, with occasional snowfall at higher elevations. Rainwater runs off rapidly, and most of the smaller streams are dry by the end of the summer.

The topography allows for a variety of different habitats. The Bay itself has both deep and shallow estuarine (mixed freshwater and saltwater) environments. In addition to estuarine species, the Bay also supports many marine species, including invertebrates, sharks, and even, on occasion,

whales. Along the shoreline are coastal salt marsh, coastal scrub, tidal mudflats, and salt ponds. Freshwater creeks and marshes, especially those that still have patches of riparian vegetation, are home to aquatic invertebrates and freshwater fish. Upland areas support a mixture of grasslands, chamise chaparral, and live oak and blue oak woodlands. Small stands of redwood, Douglas fir, and tanoak grow in moister areas.

The Great Central Valley of California contains the other three subregions: the Sacramento Valley, the San Joaquin Valley, and the Sacramento–San Joaquin Delta. Together, they form a vast, flat valley, approximately 450 miles long and averaging 50 miles wide, with elevations almost entirely below 300 feet. The Sutter Buttes, a circular set of 2,000-foot-high hills which rise from the middle of the valley floor (promoted locally as the "Smallest Mountain Range in the World"), is the only topographic feature that exceeds that height. The Central Valley is surrounded by the Sierra Nevada on the east, the coastal ranges on the west, the Tehachapi Mountains on the south, and the Klamath and Cascade mountains on the north. Less influenced by marine air than San Francisco Bay, the valley's climate has hot, dry summers and foggy, rainy winters. Annual rainfall averages from 5 inches to 25 inches, with the least rainfall occurring in the southern portions and along the west side (in the rainshadow of the coastal mountains). Agriculture dominates land uses in the Central Valley, with very few remnants of natural land remaining.

The major natural upland habitats are annual grassland, valley oaks on floodplains, and vernal pools on raised terraces. The more arid lands of the southern San Joaquin Valley also contain alkali sink and saltbush shrublands. Slow-moving rivers along the valley floor provide habitat for fish and invertebrates and help maintain adjacent riparian, wetland, and floodplain habitats.

Hydrology is the main difference between the three Central Valley subregions. The Delta is a lowlying area that contains the tidally influenced portions of the Sacramento, San Joaquin, Mokelumne, and Cosumnes rivers. The Delta was once a huge marsh formed by the confluence of the Sacramento and San Joaquin rivers. Once described as a "terraqueous labyrinth of such intricacy that unskillful navigators have been lost for days in it" (Bryant, 1848), it has been extensively drained and diked for flood protection and agriculture. Exposure of the rich, organic soils behind these levees has increased oxidation rates to such an extent that the land is breaking down and much of the surface has now subsided below sea level. Due to its natural patterns of flooding, the Delta is relatively less populated than the other subregions. The second subregion, the Sacramento Valley, contains the Sacramento River, the largest river in the state. This river historically overflowed into several low-lying areas, particularly in its lower reaches.

The lower 180 miles of the river, below Chico Landing, are now constrained by levees, and excess floodwaters are diverted into large bypasses to reduce risks to people.

The third subregion of the Central Valley, the San Joaquin Valley, has two distinct, or separate, drainages. In the northern portion, the San Joaquin River flows north toward the Delta. It captures water via several major rivers that drain the central Sierra Nevada. The southern portion of the valley is isolated from the ocean and drains into the closed Tulare Basin, which includes the beds of the former Tulare, Buena Vista, and Kern lakes. These lakes and vast wetlands historically were fed by the rivers that drain the southern Sierra Nevada (the Kings, Kaweah, Tule, and Kern). These lakes are now dry most of the time because water has been diverted to upland agriculture. Runoff during

the wettest years will occasionally flood out of river channels and temporarily refill some of these lakebeds. The California Aqueduct extends along the entire western edge of the valley, delivering water from the Delta to farmers in the Tulare basin and over the Tehachapi Mountains to Southern California. The wildlife of this region is beset by a wide variety of stressors, described below. The major problem has been the loss, degradation, and fragmentation of habitats, both terrestrial and aquatic, due to the development of agriculture and urban areas. Many of the streams have been dammed, blocking fish migration, or have been so severely degraded that they are no longer usable by salmon. Flood control structures, such as dikes, levees, and hardened embankments (riprap), have altered floodplain habitats like riparian forests and wetlands throughout the region. Many other species that persist on the remaining habitat fragments are at risk of local or rangewide extinction. Ninety-five percent of the historic Central Valley salmon habitat has been lost (CDFG, 1993).

This region is primarily in private ownership, and the role of private landowners is very important for conservation. More than 75 percent of the known California locations of 32 animal species of concern occur predominately on private lands. Examples of these species include Swainson's hawk, burrowing owl, San Pablo vole, and Buena Vista Lake shrew.

Improvement in the status and sustainability of this bioregions four runs of Chinook salmon is an important resource management goal. Reservoir dams block access to historically available Chinook salmon and steelhead spawning and rearing habitat. The current extent of spawning habitat available for salmonids (approximately 300 miles) is 5 percent of that available historically (Trust for Public Lands, 2001). Dams have also interrupted the recruitment of coarse sediment and organic material to downstream reaches. Central Valley reservoirs support sport fisheries composed primarily of non-native species or hatchery supplemented fish populations.

There are 490 vertebrate species that inhabit the Central Valley and Bay-Delta Region at some point in their life cycle, including 279 birds, 88 mammals, 40 reptiles, 18 amphibians, and 65 fish. Of the total vertebrate species that inhabit this region, 80 bird taxa, 38 mammalian taxa, 11 reptilian taxa, six amphibian taxa, and 25 fish taxa are included on the California Department of Fish and Game's Special Animals List. Of these, 20 are endemic to the Central Valley and Bay-Delta Region, and 28 other species found here are endemic to California but not restricted to this region.

Modoc: Vegetation, Ownership, and Species of Concern

Table 4.5.7
Habitat Type and Land Ownership Modoc Bioregion

Habitat Type	Bureau of Land Management	National Park Service	Other Public	Private	USDA Forest Service	Total Acres
Agriculture	4,305	59	46,807	432,363	1,705	485,238
Barren/Other	34,965	12,022	2,545	36,480	37,382	123,395
Conifer	255,052	87,102	27,471	1,386,775	1,701,909	3,458,309
Desert	48,732		12,506	42,282	7	103,527
Hardwood	13,808	447	23,846	249,127	58,361	345,589
Herbaceous	9,346	62	17,678	128,119	32,119	187,323
Shrub	1,027,076	51,457	115,633	939,230	960,938	3,094,335
Urban	376	62	6,301	16,729	171	23,638
Water	13,060	1,960	114,296	189,774	43,646	362,736
Wetland	9,338	687	14,260	94,271	19,628	138,184
Total Acres	**1,416,057**	**153,858**	**381,343**	**3,515,151**	**2,855,866**	**8,322,274**

The Modoc Plateau Region is located in the northeastern corner of the state, framed by and including the Warner Mountains and Surprise Valley along the Nevada border to the east and extending west to the edge of the southern Cascades Range. The region extends north to the Oregon border and south to include the Skedaddle Mountains and the Honey Lake Basin.

A million years ago, layered lava flows formed the 4,000-5,000 foot elevation Modoc Plateau, separating the watersheds of the region from the Klamath drainage to the northwest. The waters of the western slope of the Warner Mountains and the Modoc Plateau carved a new course, the Pit River, flowing to the southwest through the Cascades and joining the Sacramento River.

Situated on the western edge of the Great Basin, the Modoc Plateau historically has supported high desert plant communities and ecosystems similar to that region-shrub-steppe, perennial grasslands, sagebrush, antelope bitterbrush, mountain mahogany, and juniper woodlands. Sagebrush plant communities are characteristic of the region, providing important habitat for sagebrush-dependent wildlife. Conifer forests dominate the higher elevations of the Warner Mountains and the smaller volcanic mountain ranges and hills that shape the region. Wetland, spring, meadow, vernal pool, riparian, and aspen communities scattered across the rugged and otherwise dry desert landscape support diverse wildlife. The region has varied aquatic habitats, from high mountain streams to the alkaline waters of Goose Lake and Eagle Lake to clear spring waters of Fall River and Ash Creek.

Northeastern California is an outstanding region for wildlife, providing habitat for mountain lion, mule deer, pronghorn, Rocky Mountain elk, greater sage-grouse, and the colorful waterfowl of the Pacific Flyway that funnel through the area during their annual migrations.

Golden eagles, peregrine and prairie falcons, northern goshawks, sandhill cranes, and American white pelicans nest and hunt or forage in the region. The varied aquatic habitats and natural barriers along the Pit River and its tributaries have allowed the evolution of several unique aquatic communities that include endemic fish and invertebrates.

Sixty percent of the region is federally managed; the Forest Service manages 30 percent, BLM manages 26 percent, and the Fish and Wildlife Service and the Department of Defense each manage about 2 percent of the lands. State Fish and Game manages 1 percent of the region as wildlife areas. About 37 percent of the lands are privately owned or belong to municipalities.

Only 9 percent of the forests and rangelands of the Modoc region are designated as reserves, such as wilderness areas, less than is protected in other regions of the state except the Central Valley. The wilderness areas and refuges in the region are grazed by livestock (CAL FIRE, 2003). The combined total of lands managed by State Parks and the National Park Service is about 2,500 acres.

There are 399 vertebrate species that inhabit the Modoc Plateau region at some point in their life cycle, including 235 birds, 97 mammals, 23 reptiles, six amphibians, and 38 fish. Of the total vertebrate species that inhabit this region, 57 bird taxa, 21 mammalian taxa, three reptilian taxa, one amphibian taxon, and 20 fish taxa are included on the Special Animals List. Of these, three are endemic to the Modoc Plateau region, one is endemic to California but introduced to this region, and three species found here are endemic to California but not restricted to this region.

Many of the region's plant communities and ecosystems have been substantially altered or degraded over the last 120 years by a combination of stressors. Despite being in one of the least-developed regions of the state, the sagebrush, perennial bunchgrass, aspen, bitterbrush, and mountain mahogany habitats of the Modoc Plateau are among the most threatened ecosystems of North America (TNC, 2001). Aspen stands are in sharp decline (Di Orio et al., 2005). Many of the meadow and riparian areas are overgrazed or are suffering from encroachment by juniper, pine, fir, and invasive plants (Loft et al., 1998; USFS, 2001; 1991).

Sierra Nevada and Cascade: Vegetation, Ownership, and Species of Concern

Table 4.5.8
Habitat Type and Land Ownership Sierra Bioregion

Habitat Type	Bureau of Land Management	National Park Service	Other Public	Private	USDA Forest Service	Total Acres
Agriculture	7,302	7	4,618	313,117	1,174	326,219
Barren/Other	19,052	438,446	74,937	43,629	783,959	1,360,024
Conifer	181,210	938,835	73,336	1,610,067	5,036,697	7,840,145
Desert	277,168		210,376	28,044	150,487	666,075
Hardwood	139,056	127,978	92,034	1,912,131	528,287	2,799,487
Herbaceous	59,206	8,874	22,553	1,536,798	120,076	1,747,507
Shrub	486,234	62,597	83,645	632,787	1,662,552	2,927,816
Urban	1,142	623	7,757	161,216	6,074	176,811
Water	7,767	20,198	42,169	202,503	87,784	360,420
Wetland	1,384	19,672	9,148	20,969	44,541	95,714
Total Acres	**1,179,520**	**1,617,231**	**620,573**	**6,461,262**	**8,421,631**	**18,300,217**

Extending approximately 525 miles from north to south, the Sierra Nevada and Cascade ranges form the spine of the California landscape. The mostly volcanic southern Cascades stretch from north of the Oregon border southeastward, merging just south of Mt. Lassen with the northern

reaches of the predominantly granitic Sierra Nevada. To the south, the Sierra Nevada embraces the Mojave Desert to the east and curves south to link with the Tehachapi Mountains. The region includes the oak woodland foothills on the western slopes of the Sierra and Cascade ranges and, on the east, the Owens Valley and edges of the Great Basin.

On the west side, the slope of the Sierra Nevada and Cascades rises gradually from near sea level at the floor of the Central Valley to ridges ranging from 6,000 feet in the north to 14,000 feet in the south, then dropping off sharply to the east.

Unlike the Sierra, however, the east side of the Cascades slopes gradually. As the Sierra elevation increases from west to east, life zones transition from chaparral and oak woodlands to lower-level montane forests of ponderosa and sugar pine to upper montane forests of firs, Jeffrey and lodgepole pine and, above timberline, to alpine plant communities.

Federal agencies manage about 61 percent of the Sierra Nevada and Cascades: 46 percent by the Forest Service, 8 percent by the National Park Service, and 7 percent by the Bureau of Land Management. About 2 million acres are wilderness areas, mostly in the eastern and southern Sierra, managed by the Forest Service. Lands managed by the National Park Service include Lassen Volcanic, Sequoia, Kings Canyon, and Yosemite national parks and Devils Postpile National Monument. State parks and wildlife areas account for 1 percent of the region, and the remaining, approximately 36 percent of the Sierra and Cascades, is privately owned. Most of the higher elevations and the eastern Sierra are public lands, whereas most of the oak woodlands and lower mixed conifer forests and rangelands below 3,000 feet on the western slope are in private ownership. There is a checkerboard ownership pattern of private and public lands in areas of the northern half of the Sierra that lie near historical railway routes (California Resources Agency, 2004; SNEP, 1996).

About 40 percent of the state's surface-water runoff flows to the Central Valley from the Sierra and Cascades. These flows are critical to meet California's hydropower demands and agricultural and drinking water needs. Much of the water is stored in reservoirs and is conveyed by aqueducts to irrigate agriculture from Redding to Bakersfield and to provide drinking water for most of urbanized California, including the San Francisco Bay Area and Southern California (DWR, 1998).

Streams of the eastern Sierra Nevada make up the Lahontan system. Stream habitat structure and condition are similar across the system which has resulted in a relatively low number of native fish species (8). Introduced brook, rainbow, and brown trout have largely replaced native Lahontan and Paiute cutthroat trout. Paiute sculpin, mountain sucker, mountain whitefish, and speckled dace become an increasingly important part of the fish fauna as stream gradients decrease and the frequency of pool habitats increase.

The hundreds of creeks and streams of the western slope of the Sierra and Cascades drain via a dozen major river basins to merge with the Sacramento River in the north and the San Joaquin River in the south, eventually joining at the San Francisco Bay Delta. The southern forks of the Kings River and streams further south drain into the Tulare basin. The streams east of the Sierra crest flow into the Great Basin via the Lahontan, Mono, and Owens drainages. Many of the springs and creeks of northeastern California drain via the Pit River, which winds through the Cascades and joins the

Sacramento River at Lake Shasta. Maintaining and restoring the ecological health of these watersheds and aquatic systems is important to ensure clean water.

Bold topography, the large elevation gradient, and varied climatic conditions of the Sierra and Cascades support diverse plant communities. Fifty percent of California's 7,000 vascular plants are found in the region, and more than 400 plant species are endemic (Shevock, 1996). The varied conditions and floristically and structurally diverse plant communities provide a large array of habitats important for maintaining California's wildlife diversity and abundance.

The altered forest ecosystems of the Sierra and Cascades largely lack the qualities of old-growth forests or late-seral stage forests (forests that are in the later stages of development with large-diameter trees, snags, and logs) that are important for diverse and abundant wildlife (Franklin and Fites-Kaufman, 1996, USFS, 2001). Species that depend on old-growth or late-seral stage forest habitat, like the Pacific fisher, have been negatively affected. The degradation of mountain meadows and loss of willows and other riparian woody plants have affected the endangered willow flycatcher and other species that have similar habitat requirements.

New conservation challenges and opportunities will affect the Sierra and Cascade ranges in the next few decades. How new development is managed will determine the extent of wildlife habitat fragmentation. Changing global climate will alter depth and seasonality of snowpack, further modifying river flow regimes and ecosystems. The relicensing of hydropower projects provides an opportunity to change hydropower operations to reduce their effects on fish and wildlife.

Concerned about the decline of old forests and associated wildlife species of the region, Congress funded, in 1993, the Sierra Nevada Ecosystem Project (SNEP), based at U.C. Davis, for the "scientific review of the remaining old growth in the national forests of the Sierra Nevada in California, and for the study of the entire Sierra Nevada ecosystem by an independent panel of scientists, with expertise in diverse areas related to this issue." The forests of the Sierra, Cascades, and the Modoc Plateau were evaluated by a multidisciplinary team of scientists from many organizations.

SNEP completed its work and published a three-volume report in 1996. Based on the work of dozens of scientists, the report analyzed the status of conifer forests, rangelands, meadow and riparian plant communities, and aquatic ecosystems, and suggested alternatives to restore ecosystems. SNEP concluded that aquatic and riparian systems are the most altered and impaired habitats of the Sierra Nevada and Cascades. Among other critical findings, SNEP found that key causes of the decline of mammals, birds, and other vertebrates in the Sierra, Cascades, and Modoc regions include the loss and degradation of riparian areas, foothill woodlands, and diverse old forest habitats (including large trees, snags, fallen logs, and layered vegetative structure).

Meanwhile, a 1992 technical report by the Forest Service's Pacific Southwest Research Station highlighting at-risk California spotted owl populations triggered challenges and debate. That debate prompted the Forest Service to initiate a multiyear planning process that resulted in the Sierra Nevada Framework for Conservation and Collaboration, which evolved into the Sierra Nevada Forest Plan Amendment Final Environmental Impact Statement (SNFPA) covering the national forests of the Sierra, Cascades, and Modoc regions. In January 2001, The U.S. Forest Service

announced the SNFPA Record of Decision, describing chosen management options. In January 2004, the SNFPA was amended, reducing livestock-grazing and timber-harvest restrictions and giving the Forest Service greater management discretion.

There are 572 vertebrate species that inhabit the Sierra Nevada and Cascades region at some point in their life cycle, including 293 birds, 135 mammals, 46 reptiles, 37 amphibians, and 61 fish. Of the total vertebrate species that inhabit this region, 83 bird taxa, 41 mammalian taxa, 12 reptilian taxa, 23 amphibian taxa, and 31 fish taxa are included on the Special Animals List. Of these, 26 are endemic to the Sierra Nevada and Cascades Region, two are endemic to California but introduced in this region, and 26 other species found here are endemic to California but not restricted to this region.

Mojave: Vegetation, Ownership, and Species of Concern

Table 4.5.8
Habitat Type and Land Ownership Mojave Bioregion

Habitat Type	Bureau of Land Management	National Park Service	Other Public	Private	USDA Forest Service	Total Acres
Agriculture	1,418		3,548	181,022	25	186,014
Barren/Other	54,220	226,922	47,645	23,569	2,291	454,647
Conifer	185,757	202,935	4,305	19,053	2,326	614,376
Desert	7,287,723	4,352,961	2,788,577	3,113,871	26,131	17,569,264
Hardwood	8,787	25	146	34,355	875	44,187
Herbaceous	52,752		4,352	83,608	4,848	145,560
Shrub	156,848	152,783	17,352	196,726	20,082	543,790
Urban	13,593	2,454	42,769	281,836	82	340,734
Water	9,578	2,078	2,523	20,075	166	34,419
Wetland	232	741	101	736	47	1,858
Total Acres	**7,770,908**	**4,940,899**	**3,081,318**	**4,054,851**	**86,872**	**19,934,849**

About 80 percent of the Mojave Desert in California is managed by federal agencies. The Bureau of Land Management (BLM), the largest land manager of the region, oversees 8 million acres, or 41 percent, of the federally owned sector. The National Park Service manages the Mojave National Preserve and Death Valley and Joshua Tree National Parks, which account for another 26 percent of the region. The Department of Defense manages five military bases that cover about 13 percent of the region. State Parks and Fish and Game wildlife areas account for just 0.32 percent of the region. About 18 percent of the region belongs to private landowners or municipalities (California Resources Agency 1998, 2004).

The Amargosa and Mohave Rivers are found in this bioregion and provide habitat for the desert pupfish and other pupfish species.

There are 439 vertebrate species that inhabit the Mojave Desert Region at some point in their life cycle, including 252 birds, 101 mammals, 57 reptiles, 10 amphibians, and 19 fish. Of the total vertebrate species that inhabit this region, 69 bird taxa, 38 mammalian taxa, 15 reptilian taxa, four

amphibian taxa, and nine fish taxa are included on the Special Animals List. Of these, 14 are endemic to the Mojave Desert Region, one is endemic to California but introduced to this region, and 15 other species found here are endemic to California but not restricted to this region.

Colorado Desert: Vegetation, Ownership, and Species of Concern

Table 4.5.9
Habitat Type and Land Ownership Colorado Desert Bioregion

Habitat Type	Bureau of Land Management	National Park Service	Other Public	Private	USDA Forest Service	Total Acres
Agriculture	26,018		31,748	763,331	5	821,102
Barren/Other	88,891	54	9,103	2,224	30	100,303
Conifer	16,685	1,045	54,907	7,653	1,287	81,577
Desert	2,596,517	324,553	1,083,300	969,928	1,401	4,975,699
Hardwood	867		2,231	3,590	625	7,314
Herbaceous	3,373		53,054	3,781	12	60,220
Shrub	78,965		110,036	85,827	5,651	280,479
Urban	8,281	109	7,428	161,876	35	177,728
Water	5,706		56,923	189,604		252,233
Wetland	2			628		630
Total Acres	**2,825,304**	**325,761**	**1,408,731**	**2,188,442**	**9,047**	**6,757,284**

The region's terrestrial habitats include creosote bush scrub; mixed scrub, including yucca and cholla cactus; desert saltbush; sandy soil grasslands; and desert dunes. Higher elevations are dominated by pinyon pine and California juniper, with areas of manzanita and Coulter pine. In addition to hardy perennials, more than half of the desert's plant species are herbaceous annuals, and appropriately timed winter rains produce abundant early spring wildflowers. In the southern portion of the region, the additional moisture supplied by summer rainfall fosters the germination of summer annual plants and supports smoketree, ironwood, and palo verde trees.

In the Colorado Desert's arid environment, aquatic and wetland habitats are limited in extent but are critically important to wildlife. Runoff from seasonal rains and groundwater springs forms canyonmouth- associated alluvial fans, desert arroyos, desert fan palm oases, freshwater marshes, brine lakes, desert washes, ephemeral and perennial streams, and riparian vegetation communities dominated by cottonwood, willow, and non-native tamarisk. Two of the region's most significant aquatic systems are the Salton Sea and the Colorado River.

While most desert wildlife depends on aquatic habitats as water sources, a number of species, such as arroyo toad, desert pupfish, Yuma clapper rail, and southwestern willow flycatcher, are restricted to these habitats. In some places, summer rains produce short-lived seasonal pools that host uncommon species like Couch's spadefoot toad.

Desert fan palm oases are rare ecological communities found only in the Colorado Desert here permanent water sources are available. With an overstory of desert fan palm trees, these communities provide unique islands of shade, moisture, and vegetation in an otherwise arid and sparse landscape.

The BLM administers about 2.9 million acres, or 43.1 percent of the region. Department of Defense lands account for about 500,000 acres, or 7 percent, of the region and are the bioregions largest land manager. Joshua Tree National Park spans the transition from the Mojave to the Colorado Desert, with slightly less than half the park, about 340,000 acres, in the Colorado Desert. Anza Borrego Desert State Park encompasses over 600,000 acres, or nearly 9 percent, of the region, and the Santa Rosa Wildlife Area, which includes Fish and Game, State Lands Commission, and BLM lands, encompasses about 100,000 acres.

Together, Joshua Tree National Park, Anza Borrego Desert State Park, and the Santa Rosa Wildlife Area, along with other protected lands in the Mojave Desert, are part of the Mojave and Colorado Deserts Biosphere Reserve, designated by the United Nations as an important global site for preservation of the biological and cultural resources of these two desert regions.

The diverse wildlife inhabiting the Colorado Desert includes many species specially adapted to the unique desert habitats. There are 481 vertebrate species that inhabit the region at some point in their life cycle, including 282 birds, 82 mammals, 66 reptiles, 16 amphibians, and 35 fish. Of these vertebrate species, 84 bird taxa, 34 mammalian taxa, 21 reptilian taxa, five amphibian taxa, and four fish taxa are in included on the Special Animals List. Of these, four are endemic to the Colorado Desert region, and four other species found here are endemic to California but not restrict to this region.